

The spatial resolution of the X-ray tomograph is equal to 140  $\mu\text{m}$ .

## References

1. Zhao W. et al. Beam hardening correction for cone-beam CT system and its effect on spatial resolution// Chinese Physics. -2009.-No.10. P. 1–8.
2. [Watanabe](#) H et al. Modulation transfer function evaluation of cone beam computed tomography for dental use with the oversampling method// Dentomaxillofac Radiol. 2010 Jan; 39(1): 28–32.
3. [Rueckel](#) J. et al. Spatial resolution characterization of a X-ray microCT system// [Applied Radiation and Isotopes](#). – 2014. –Vol. 94. – P. 230–234

## RESEARCH AND MANUFACTURE OF SAMPLES FOR THE PRACTICAL TEST IN METHODS OF NONDESTRUCTIVE INSPECTION

*Pronichev E.A.*

*Tomsk Polytechnic University, Tomsk*

*Scientific advisor: Kalinichenko N.P. Associate Prof., TPU*

*Linguistic advisor: Kalinichenko A.N. Associate Prof., TPU*

Today, with the growing demands for quality, reliability, safety and remaining life prediction of components, non-destructive testing personnel are entrusted with more responsibility than ever. NDT experts performing test, undergo rigorous training and are required to pass certification examinations as per the schemes stipulated by the national or international standards prevailing in the respective country. For renewal or revalidation of a certificate, which is valid only for a limited period, it becomes necessary for NDT personnel to keep their NDT knowledge up to date. In process of certification NDT specialists there are used control samples that are made from advance and certain material with different types of defects. The variety of test samples used in the inspection, their duplication and complexity create disorder in the selection of the required sample. To solve this problem, control samples are classified into the following groups.

### Classification of defects

By localization of defects:

- with surface defects;
- with subsurface defects.

According to a method of producing defects:

- with natural defects;
- with artificial defects.

Outcropping defects are called surface defects. Defects at a depth of a few millimeters are called subsurface. Samples with natural defect are selected from defective products with the defect dimensions of which correspond to the level of sensitivity. Artificial defects obtain by fabricating the preform and its subsequent processing to produce a certain type of defect.

### **Production of test samples**

Shape, material and samples manufacturing technology are chosen so as to provide stability of cracks and material properties within the prescribed period of service and the resistance of samples against corrosion while exposed by penetrant. The samples should have a clean surface, and cracks should also be free from contamination.

When actual or representative test parts containing natural discontinuities of the type, location and size needed for evaluation are not available or impractical then fabricated test part with artificial discontinuities such as flat bottom holes, slots, notches, side drilled holes etc. or commercially available defect sample may be used for evaluating the flaws and the performance of the NDT system. When checking the NDT materials there are at least two samples with the same characteristics applied. In the figure 1 you can see the scheme of control sample. The first is used all the time, and the second is used in case of poor detection of cracks.

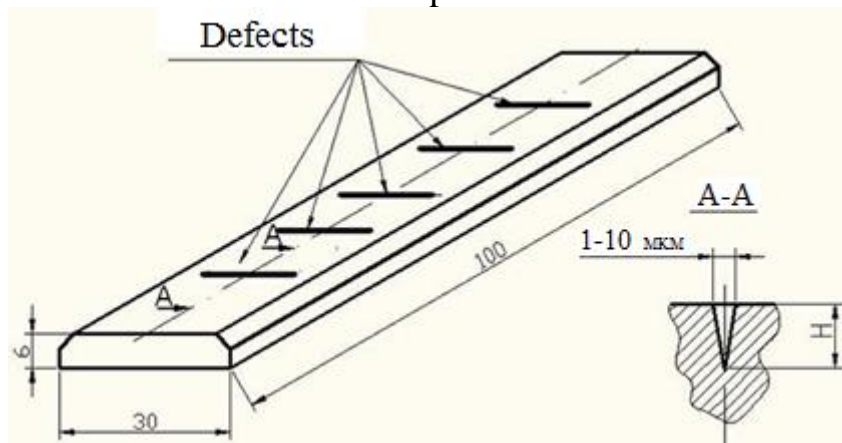


Figure 1 Control sample

Characteristics, such as location, size, shape, type and orientation of a natural flaw in the test specimen can be determined easily if its signal is compared to that from an artificial flaw which simulates it in all aspects. To some extent, notches represent surface opening flaws like cracks, lap, seam etc. Flat bottom holes are representative of embedded flaws like inclusions,

laminations etc, whereas linear flaws inside the materials are represented by side drilled holes.

After producing samples exposed metrological certification to determine their technical specifications.

Each test sample has a passport, which indicates the measured geometric characteristics of fractures, as well as photos and sketches of test tracks.

Besides system verification, defect samples are also used for checking and certifying the practical skill of the NDT personnel. Use of representative test parts with natural discontinuities are considered to impart high level of confidence to the NDT personnel and therefore, day by day, their use is considered more reliable for certifying the practical skills of NDT personnel during training and certification examination.

Promising avenue for development at the moment is the creation of the control samples with views of defects, the most common in controlled products.

### **References**

1. Babadjanov L.S., Babadjanova M.L. Measures and samples in the non-destructive testing. - Moscow: Federal State Unitary Enterprise "Standartinform", 2007. – 208 p.

2. Yermolov I.N., Ostanin Yu.Ya. Methods and means for non-destructive quality control: A manual for engineers and technicians of universities.- M.: Higher. sch., 1988. – 368 p.

### **SOME BENEFITS OF ROBOTIC SURGERY**

*Sidakova V.S.*

*Tomsk polytechnic university, Tomsk*

*Scientific supervisor M.V. Kuimova, PhD in Methods of TFL,*

*Associate Professor of TPU*

Robots play an important role in modern medicine and in the treatment of patients. They give a promising answer to the challenging realities of modern health care. The use of robots contributes to fewer medical staff, shorter hospitalization and reduction of service and treatment costs. Remote medical robots can connect patients who need specialized care with surgeons, physicians who can help them – even if they are miles apart.

Owing to robots, surgeons can perform operations at a distance that helps to solve the problem of the specialists' shortage. Usually during